CLAIMS

1. An essentially vinyl chloride-free suspension polymerization process for polymerizing styrene monomer, or a mixture of monomers comprising styrene, comprising the step of continuously or semi-continuously dosing an initiator, or a mixture of initiators, to the reaction mixture at the polymerization temperature, characterized in that at least one initiator that is dosed has a half-life of 60 minutes or less at said polymerization temperature.

2. Process according to claim 1 wherein the composition further comprises co-monomers selected from the group consisting of vinyl acetate, ethylene, propylene, acrylonitrile, butadiene, (meth)acrylates, and ethylenically unsaturated polymers, such as polybutadiene and styrene butadiene rubber.

3. Process according to claim 1 or 2 wherein said initiator is dosed continuously or semi-continuously from the point in time at which at least 1%, preferably at least 0.5%, more preferably at least 0.1%, most preferably none of the monomer has already been polymerized until at least 70%, preferably at least 80%, more preferably at least 90%, and most preferably essentially all of the monomer is polymerized, the term "essentially all of the monomer is polymerized" meaning that less than 1,000 ppm of monomer is present in the final polymerized product.

4. Process according to any one of claims 1-3 wherein the initiator is selected from the group consisting of peroxydicarbonates, peroxycarbonates, peroxyesters, peroxyketals, diacylperoxides, dialkylperoxides, ketone peroxides, azo-initiators, each of which can have one, two, or more –OO-, and/or –NN- moieties in each molecule, and each of which is optionally further functionalized with amines, phosphates, esters, ethers, or alcohol moieties, and mixtures thereof, said initiators being preferably selected

from the group consisting of substituted, or unsubstituted, dibenzoylperoxides, 1,1-di(tert-butylperoxy)-3,3,5-trimethylcyclohexane, 2,2-di(tert-butylperoxy)butane, 1,1-di(tert-butylperoxy)cyclohexane, azo initiators, and mixtures thereof, most preferably from dibenzoylperoxide, 1,1-di(tert-butylperoxy)-3,3,5-trimethylcyclohexane, 2,2'-azobis(isobutyronitrile), 2,2'-azobis(2-methylbutyronitrile), and mixtures thereof.

5. Process according to any one of claims 1-4 wherein the reaction temperature is 170°C or lower, preferably 150°C or lower, more preferably 130°C or lower, and most preferably 120°C or lower.

6. Process according to any one of claims 1-5 wherein at least part of the initiator is continuously or semi-continuously dosed over a period of at least 0.5 hour, preferably at least 1 hour.

7. Process according to any one of claims 1-6 wherein at least 0.01 wt.%, more preferably at least 0.05 wt.%, and most preferably at least 0.1 wt.% of the combined weight of all initiators and preferably at most 5 wt.%, more preferably at most 3 wt.%, and most preferably at most 1 wt.% of the combined weight of all initiators, based on the weight of the monomers to be polymerized, is used.

8. Process according to any one of claims 1-7 wherein a blowing agent is added or dosed to the reaction mixture when the degree of polymerization of the monomer is less than 80%, preferably less than 60%, and most preferably less than 50%.

9. Process according to any one of claims 1-8 wherein the initiator, or mixture of initiators, is dosed in the form of a, preferably aqueous, dispersion.

10. Process according to any one of claims 1-9 wherein an additional initiator is used to reduce the residual monomer level.

11. Process according to claim 10 for the preparation of expandable polystyrene.

12. Styrene based (co)polymer obtainable by a process according to any one of claims 1-11, wherein the styrene based (co)polymer has less than 50 ppm of residual initiator, more preferably less than 40 ppm, and most preferably less than 25 ppm of initiator, immediately after drying for 1 hour at 60°C and screening.

13. Use of a styrene (co)polymer according to claim 12 in a shaping process involving the heating of the co(polymer) for the preparation of foamed articles.